Computer-based process control and data acquisition systems are a key element in the successful operation of complicated systems. Software that allows real-time initiation and control of processes at remote sites is being used on many systems outside fusion. This software, which allows personnel at one site to control and adjust systems at another location, will make "telecommuting" easier. It was made possible by advances in computer networking—the linking of computers at many sites via telephone systems, satellites, and optical cables.

Fusion research has been at the forefront of networked computing since 1974, when the Department of Energy initiated a national computer network for fusion research. The Controlled Thermonuclear Research Computer Center, established in 1974 to meet the computational demands of the national magnetic fusion energy program, was a pioneer in providing centralized supercomputing via network access.

Today, as the National Energy Research Supercomputer Center (NERSC), this center serves both fusion and a number of other energy research programs and is a valuable educational resource. NERSC administers the Energy Sciences Network (ESnet), a nationwide computer data communications network that provides supercomputing resources to and connections among researchers at national laboratories, universities, private laboratories, and industrial organizations involved in energy research. It is also the home of the National High School Supercomputer, a single-processor CRAY X-MP that is being made available by NERSC, the Department of Energy, and Cray Research, Inc., to use supercomputing as both a teaching tool and a catalyst to spark student interest in science and mathematics.

The national High Performance Computing and Communications Initiative calls for the establishment of a National Research and Education Network (NREN) that will be hundreds of times faster than today's networks. Through ESnet, the Department of Energy is responsible for implementing the emerging technologies to support the desired data transmission rates of close to one billion bits per second. With the networks of NASA and the National Science Foundation, ESnet will serve as the backbone for the NREN.
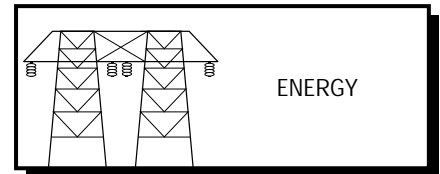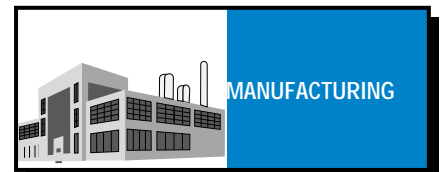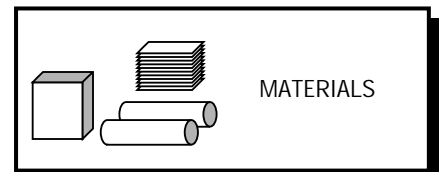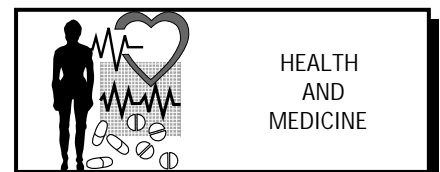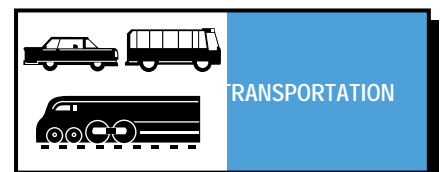

ENERGY

ENVIRONMENT

DEFENSE

AEROSPACE

MANUFACTURING

MATERIALS

COMPUTING AND ELECTRONICS

HEALTH AND MEDICINE

TRANSPORTATION